

Chapter 3

PLANNING AREA DESCRIPTION

SUMMARY OF WATER RESOURCE SYSTEMS

Water for urban and agricultural uses in the UEC Planning Area comes from three main sources: the Floridan Aquifer System (FAS), the Surficial Aquifer System (SAS), and surface water. Surface water is used primarily for agricultural irrigation, with the FAS used as a backup source during periods of low rainfall. The SAS is the principal source for public water supply and urban irrigation. However, as the population in the planning area increases, the urban areas are anticipated to increase their use of FAS as a source of drinking water.

The SAS and surface water are dependent upon rainfall for recharge. The average annual rainfall in the UEC Planning Area is about 51 inches. Over 70 percent of this occurs during the wet season months, from June through October. In addition to seasonal variation, rainfall varies significantly from year to year with historic annual amounts ranging from 30 inches to over 90 inches in the planning area. Rainfall also varies areally, with rainfall amounts generally decreasing from east to west.

Ground Water

In the UEC Planning Area, the surficial aquifer is a shallow unconfined aquifer with fairly good water quality and is a primary source for urban drinking water and urban irrigation. Because it is close to the surface, this aquifer is easily recharged by local rainfall in the planning area. In terms of water quantity, the SAS is not as prolific as the FAS.

The FAS is separated from the overlying SAS by a thick, low permeability confining layer and is found approximately 800 feet below the land surface in the UEC Planning Area. Because of this confining unit, the Floridan aquifer is not recharged by local rainfall, but instead is recharged in central Florida where the confining unit is thinner and more permeable.

The FAS is relatively saline in the planning area and is also artesian, meaning it flows naturally at land surface. In fact, average water levels in Floridan aquifer wells rise 20 to 30 feet above the land surface in the region. Because of concerns of upconing of higher salinity water from deeper portions of the aquifer, there is a prohibition on the use of pumps on Floridan aquifer wells. The Floridan is used by agriculture mainly as a back up to surface water. Some public water supply utilities

use the FAS for a water source, but these systems require removal of salts via desalination. Many public water suppliers are looking to the FAS as a future source.

Surface Water

There are four primary drainage canals in the UEC Planning Area that are part of the Central and Southern Florida Flood Control Project. These canals (C-23, C-24, C-25 and C-44) have also become important sources of irrigation water within their respective drainage basins.

The C-44 canal was constructed as a navigable flood control outlet for Lake Okeechobee. It is the only one of the four canals that receives inflow from outside its drainage basin. The C-23, C-24, and C-25 canals, by contrast, are solely dependent on rainfall as a source of inflow. As a result of the large demand for this limited surface water supply, there are prohibitions for any new or expanded water supply uses of these three canals.

SUMMARY OF NATURAL SYSTEMS

Major natural systems within the UEC Planning Area consist of inland and coastal resources and include Lake Okeechobee, Indian River Lagoon, St. Lucie River and Estuary, the Savannas, Pal-Mar, Jonathan Dickinson State Park, and DuPuis Reserve. Figure 3 depicts natural areas in the UEC region and those that are publicly owned.

The Loxahatchee River basin, approximately 200 square miles in size, is bisected by the Martin – Palm Beach County line. This county line is also the boundary between the UEC and Lower East Coast Planning Areas. Most of the river basin within the UEC region remains relatively undeveloped, and includes large natural areas such as Jonathan Dickinson State Park and the Pal-Mar wetlands. The portion of the Loxahatchee Basin within the LEC has experienced significant hydrologic alteration and is the focus of restoration efforts. Restoration of the Loxahatchee Slough hydroperiod, and the delivery of appropriate flows to the Loxahatchee River will be addressed in the LEC Plan. Contributions from the Martin County subbasins will be considered in the LEC Plan. A detailed subregional modeling analysis of Northern Palm Beach County surface water systems is currently underway with the goal of providing an integrated environmental restoration/water supply plan for this area.

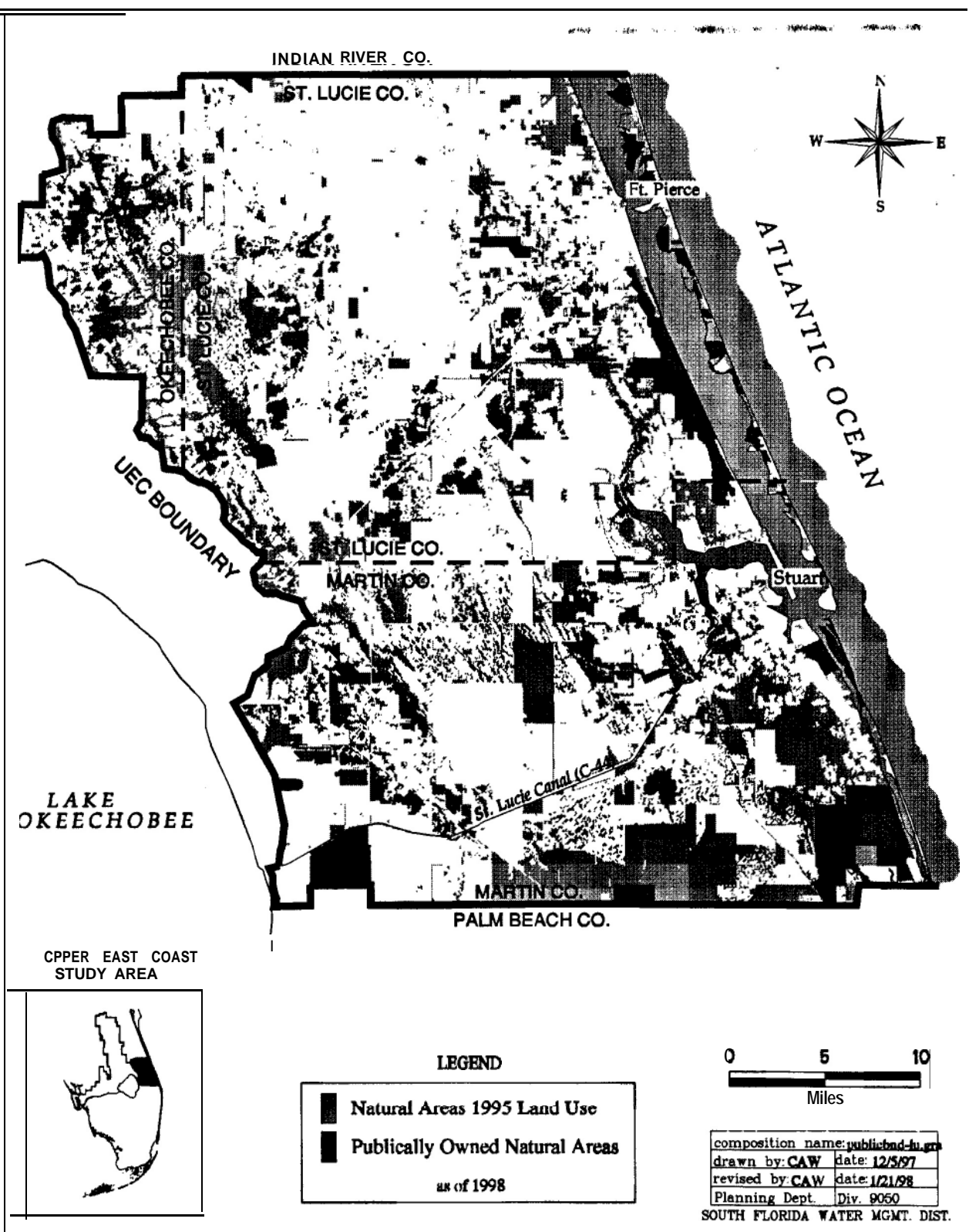


Figure 3. Natural Areas and Publicly Owned Lands.

Inland Resources

Lake Okeechobee is the largest freshwater lake in the southeastern United States and is a major feeding and roosting area for wading birds and migratory fowl. The natural systems of regional significance in the western portion of the planning area include Pal-Mar and DuPuis Reserve. The Pal-Mar Tract is located at the southern edge of the planning area in Martin and Palm Beach counties. The proposed Pal-Mar Save Our Rivers acquisition boundary includes a wildlife corridor that would connect to other natural systems, including Jonathan Dickinson State Park and the DuPuis Reserve. These natural areas contain pine flatwoods, sand pine scrub, and a variety of wetland habitat.

A coastal ridge is present along the eastern edge of the planning area. This ridge is dominated by sand pine scrub and provides habitat for many protected species of plants and animals. Eastern portions of the Savannas State Reserve and Jonathan Dickinson State Park are located on the coastal ridge in St. Lucie and Martin counties. The Savannas contains a remnant coastal wetland system.

Coastal Resources

The Indian River Lagoon system is composed of three interconnected estuarine lagoons, the Mosquito Lagoon, Indian River Lagoon and the Banana River Lagoon. The lagoon system extends about 155 miles from Volusia County southward to Palm Beach County. The system is fairly shallow and narrow, with an average depth of 4 feet, and a width that varies from 0.2 to 5.5 miles. Circulation in these lagoons is generally sluggish except during large storms and in areas near inlets.

The lagoon system is a biogeographic transition zone, rich in habitats and species, with the highest species diversity of any estuary in North America (SFWMD and SJRWMD, 1994; SFWMD, 1997). Approximately 2,200 species have been identified in the lagoon system (SFWMD and SJRWMD, 1994; SFWMD, 1997), 35 of which are listed as threatened or endangered.

The St. Lucie Estuary (SLE) is located in the southern region of the Indian River Lagoon. The Estuary, encompassing about eight square miles, has an expanded watershed area of approximately 775 square miles due to the construction of extensive agricultural and urban drainage projects. In addition, the Estuary is linked to Lake Okeechobee by the C-44 canal that is utilized for both navigation and the release of flood waters from the Lake. The Estuary is divided into three major areas; the inner estuary, comprised of the North and South Forks; the mid-estuary, consisting of the area from the juncture of the North and South Forks to Hell Gate; and the outer estuary extending from Hell Gate to the St. Lucie Inlet. The main body of the North Fork is about four miles long, and has a maximum

depth of 10 feet. The North Fork is designated as an aquatic preserve. The South Fork is approximately 2.5 miles long and has maximum depths approaching 10 feet. The mid-estuary extends approximately five miles from the Roosevelt Bridge to Hell Gate with a maximum depth of about 25 feet. Generally, the Estuary is much shallower than these maximum depths.

LAND USE TRENDS AND WATER DEMANDS

Land use in the UEC Planning Area has been predominantly agricultural (Table 3) and is expected to remain so in the future. However, the percentage of agricultural land use in Martin and St. Lucie counties is anticipated to decrease as a result of an increase in urban land use.

Table 3. Acreages and Percentages of Land Use by County.

Land Use	Martin County		St. Lucie County		Okeechobee Area		UEC Planning Area	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Agriculture	137,361	40	191,081	50	35,601	60	364,043	46
Urban and Transportation	50,416	15	72,500	19	717	1	123,633	16
Wetlands	54,116	16	33,374	9	11,669	20	99,159	13
Upland Forest	64,201	19	38,880	10	7,874	13	110,955	14
Rangeland	5,503	2	8,129	2	1,558	3	15,190	2
Barren	2,075	1	316	0	87	0	2,478	0
Water	26,706	8	40,612	10	1,955	3	69,273	9
Total	340,378	100	384,892	100	59,461	100	784,731	100

Source: SFWMD Florida Land Use/Land Cover GIS database, 1995.

Note: Percentages rounded to the nearest tenth.

Citrus is by far the dominant irrigated crop in the planning area and occupies over four-fifths of the irrigated agricultural acreage in the region. Since 1980, citrus acreage has grown moderately but continuously, and is associated with the movement of citrus southward from Central Florida following several severe winter freezes in the mid-1980s. Irrigated citrus acreage in the planning area is projected to grow by 32 percent from about 134,000 acres in 1990 to 176,000 acres in 2020.

Population in the planning area is projected to increase by 83 percent to almost 461,900 by 2020 (Table 4). Urban water demand in the planning area is projected to increase by 89 percent from 66 million gallons per day (MGD) in 1990 to 125 MGD in 2020, while agricultural water demand is forecast to increase by 23 percent from 357 MGD in 1990 to 440 MGD in 2020 (Table 4). About 85 percent of the agricultural water demand in 2020 will be for citrus. Total water demands in the UEC region are projected to increase 142 MGD (34 percent) above 1990 estimates to 565 MGD by 2020.

Table 4. UECWSP Population and Water Demands for 1990 and 2020.

Category	1990	2020	% Change
Population	252,086	461,900	83
Water Demands (MGD)			
Agricultural	357	440	23
Urban	66	125	89
Total Planning Area	423	565	34

Water Sources by Land Use Type

There is a transition in land use from urban in the east to agricultural in the west (Figure 4). This transition is reflected in the water demands placed on surface water and ground water resources. The principal source of water for urban demands is the SAS. However, a few public water supply utilities have recently turned to the FAS, which is desalinated to supply potable uses. Martin County Utilities, as well as many coastal developments, are currently using, or plan to use desalinated FAS water to supply their service areas. In addition, the Fort Pierce Utilities Authority blends upper Floridan water of sufficient quality with SAS water treated by lime softening.

Several other utilities plan to use the FAS to supplement SAS withdrawals to meet future demands.

The primary source of water for agriculture is surface water. However, the FAS is an important source of agricultural irrigation water in St. Lucie County, and to a lesser extent, in Martin County when surface water availability is limited.

Water Demands by Land Use Type

Annual water demand by land use type was estimated for agricultural and urban land uses (Table 5). Water demands can vary significantly between land use types. The supplemental irrigation requirements for agriculture are based on crop type, soil type, rainfall, and irrigation system efficiency, among other variables. For urban residential demand, the number of households per acre, persons per household, and per capita water use were the input variables. Factors not accounted for in the table that should be considered are the impervious surface, landscape irrigation, open space, runoff, and habitat for wildlife.

Commercial and industrial demands vary greatly by type of business. In the UEC Planning Area, commercial and industrial demand is about one percent of the overall water demand. Because the demand is relatively small and difficult to generalize, an average demand was not calculated.

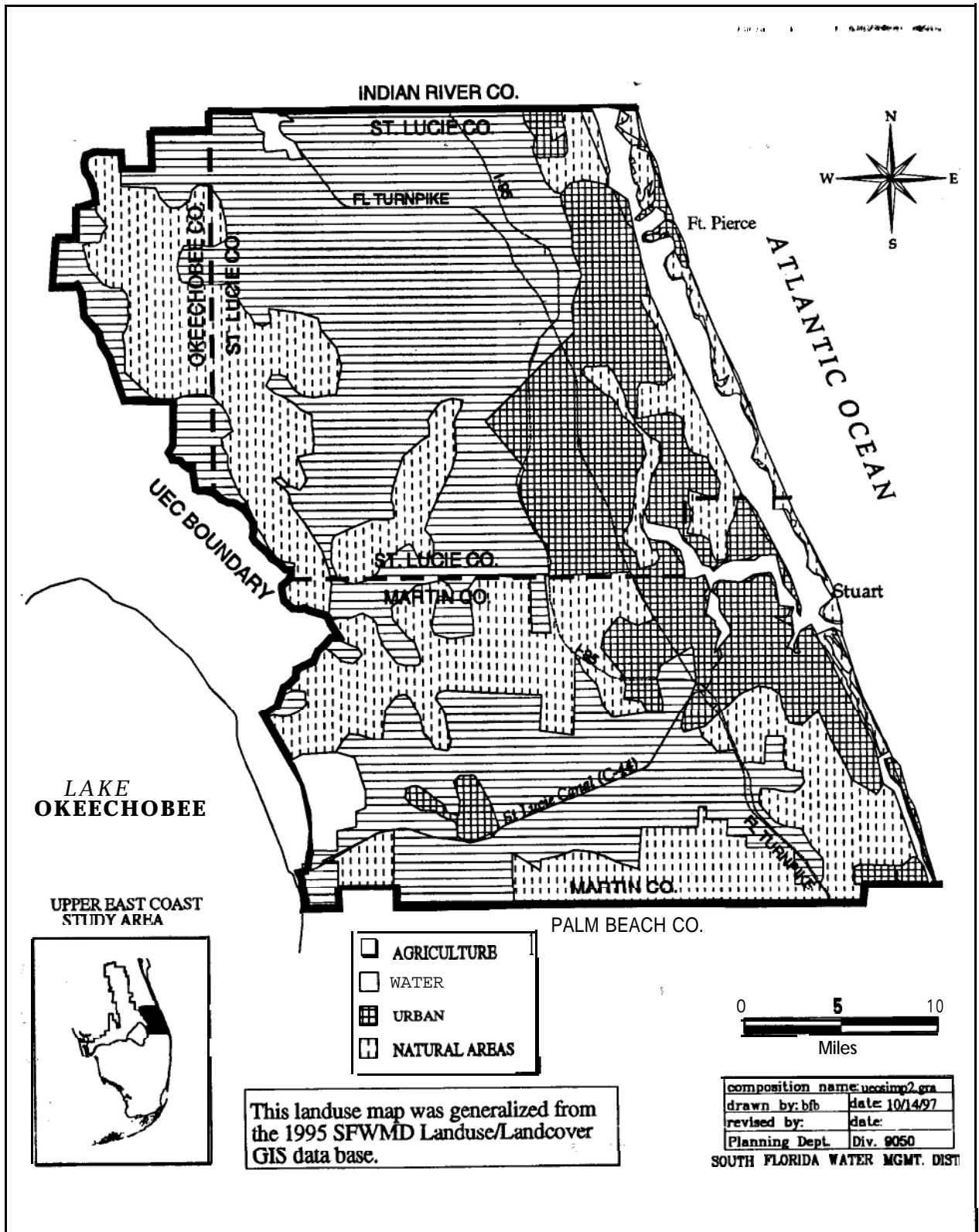


Figure 4. Generalized Land Use in the UEC Planning Area.

Table 5. Estimated Water Demand by Land Use Type.

Land Use Category	Annual Water Demand	
Agricultural	Inches per acre	Gallons per acre
Citrus+	24.80	673,380
Ornamental Nursery [¶]	31.12	844,970
Sugarcane [▲]	22.61	613,915
Turf Grass [*]	31.68	860,175
Vegetables [¶]	16.96	460,505
Urban		
Residential (3 units per acre)**	16.05	435,700
Commercial and Industrial	---	---

[¶]Calculated using the modified Blaney-Criddle method; average using rainfall from Stuart and Ft. Pierce stations; soil type: 0.8 inches; vegetables: 3 plantings.

[°]**Calculated** using the modified Blaney-Criddle method; average using rainfall from Stuart and Ft. Pierce stations; soil type: 1.5 inches.

[▲] Calculated using the modified Blaney-Criddle method; rainfall station: Indiantown; soil type: 0.8 inches

^{*}Includes golf courses, landscaped areas, and sod farms.

^{**}Assumes per capita of 173 gpcd and 2.3 persons per household.